MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

ECE2056 – DATA COMMUNICATIONS AND NETWORKING

(All Groups)

3 MARCH 2016
9:00 a.m. - 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 6 pages including cover page with 4 Questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

Question 1

(a) What does **protocol** mean in the context of data communication. Why is it so important?

[10 marks]

(b) What are the **THREE (3)** types of data flow in data communication (i.e. ____plex). Explain each of them.

[6 marks]

(c) Addressing is one of the most important requirements for data communication.

(i) What is the type of address used at the **network layer** of the TCP/IP network model?

[1 mark]

(ii) What is the type of address used at the **transport layer**?

[1 mark]

(iii) Describe the differences between the two types of addresses. You can use analogies to enhance your description.

[2 marks]

(d) Virtual-circuit switching is a cross between circuit and packet switching.

(i) Describe the mechanism that allows it to achieve the benefits of both circuit and packet switching.

[4 marks]

(ii) Using Table Q1(d) as shown, determine the **outgoing port** and **outgoing VCI** for the following incoming packets.

Data	**45**

[0.5 marks]

Data	**143**

[0.5 marks]

Table Q1(d)

Incoming		**Outgoing**	
Port	**VCI**	**Port**	**VCI**
1	54	6	75
2	143	6	43
2	34	6	34
3	65	8	34
4	97	8	78
4	164	9	95
5	45	10	132

Continued...

Question 2

(a) Name the **THREE (3)** types of communication if their definitions are given as:

(i) One-to-one communication [1.5 marks]
(ii) One-to-many communication [1.5 marks]
(iii) One-to-all communication [1.5 marks]

(b) Point-to-Point Protocol (PPP) is a very popular data-link protocol to connect home computers to the ISP.

(i) What are the **TWO (2)** types of authentication protocol for PPP? Include both the full names and their corresponding abbreviations.

[3 marks]

(ii) Which of the two is the more secure one? Justify your answer.

[4 marks]

(c) ALOHA is the earliest random-access method. A station transmits whenever it has data to transmit.

(i) What is the average transmission time for a 1000-bit frame on a shared channel of 1 Mbps?

[3 marks]

(ii) What is the vulnerable time for this configuration?

[2 marks]

(d) If the data-link protocol is Ethernet, the link-layer address is called the MAC address. The MAC address is 48 bits long. For each of the addresses that you have named earlier in Question 2(a), give **ONE (1)** example of the correct MAC address.

(i) One-to-one communication [1.5 marks]
(ii) One-to-many communication [1.5 marks]
(iii) One-to-all communication [1.5 marks]

(e) The Ethernet protocol had evolved progressively since it was developed in the 1970s. List the **FOUR (4)** generations of Ethernet and their corresponding transmission rate.

[4 marks]

Continued...

Question 3

(a) The Internet Protocol (IP) is an important network layer protocol that enables host-to-host delivery and routing.

(i) Is IP a connection-oriented or connectionless protocol? Justify your choice.

[2 marks]

(ii) Is IP a reliable or unreliable protocol? Justify your answer.

[2 marks]

(iii) How many bits are there in an IPv4 address?

[1 mark]

(b) Refer to Figure Q3(b). If you are given the IP address of 10.0.10.0/24, design an IP addressing scheme with subnetting that can accommodate 4 subnets and 62 usable hosts in each subnet.

(i) How many bits must be **borrowed** from the host portion to accommodate 4 subnets?

[1 mark]

(ii) How many bits must be **reserved** to accommodate 62 usable hosts?

[1 mark]

(iii) What is the **subnet mask**?

[1 mark]

(iv) Calculate and list the **network addresses** of the 4 subnets.

[4 marks]

(v) What are the corresponding **broadcast addresses** of the 4 subnets?

[4 marks]

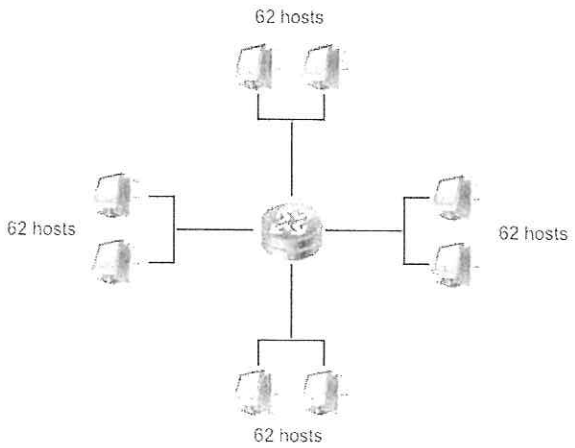

Figure Q3(b)

Continued...

(c) What are the **TWO (2)** benefits of subnetting?

[4 marks]

(d) An IPv6 address is given as BACD:0000:0000:8139:0800:201C:0000:417A. Identify whether the following simplified IPv6 presentations are **correct** or **incorrect**? Briefly explain your answer.

(i) BACD:0:0:8139:800:201C:0:417A [1 mark]
(ii) BACD::8139:800:201C:0:417A [2 marks]
(iii) BACD::8139:800:201C::417A [2 marks]

Question 4

(a) If you had to design a real-time video conferencing application, which transport layer protocol would you use; Transmission Control Protocol (TCP) or User Datagram Protocol (UDP)? Justify your answer.

[6 marks]

(b) TCP is considered to be **connection-oriented** and **reliable**.

(i) Explain the term connection-oriented.

[2 marks]

(ii) Explain the term reliable.

[2 marks]

(c) Since TCP is connection-oriented, it has to establish a connection prior to sending data.

(i) Draw the flow diagram similarly with Figure Q4(d) that illustrates **TCP's Three-Way-Handshake**. In your diagram, be sure to include the sequence and acknowledgement numbers.

[6 marks]

(ii) Describe the Three-Way-Handshake that you have drawn in Question 4(c)(i).

[4 marks]

Continued...

(d) TCP uses sequence and acknowledgement numbers as part of its protocol. Complete the flow diagram in Figure Q4(d). You do not need to redraw the flow diagram.

[5 marks]

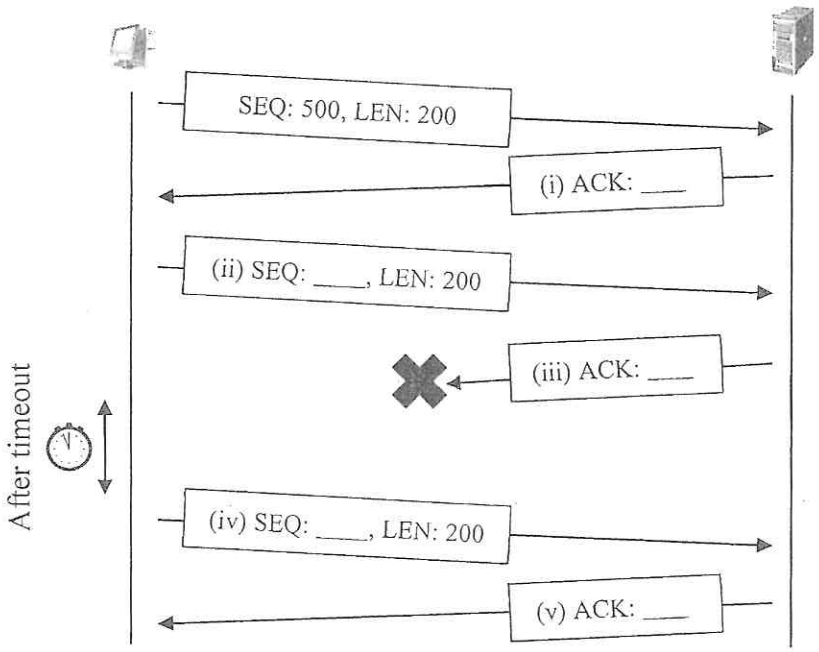

Figure Q4(d)

End of Paper